

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

Remarks/Arguments

Applicants have received and carefully reviewed the Office Action of the Examiner mailed January 15, 2004. Claims 1-34 remain pending in the application.

As a preliminary matter, and in the Office Action Summary (Form PTOL-326), the Examiner indicates that only claims 1-30 are pending in the application. However, in the Amendment-After-Final filed on June 11, 2003, claims 31-34 were added. Also, a check for \$408.00 was provided to pay for the extra claim charges. It is not clear from the Office Action mailed January 15, 2004 if the Amendment-After-Final was entered. However, if the Amendment-After-Final was not entered, please add claims 31-34, and consider them as "Newly Presented" rather than "Previously Presented". The additional claim charges have already been paid.

In paragraph 2 of the Office Action, the Examiner rejected claims 1, 2 and 9 under 35 U.S.C. § 102(b) as being anticipated by Bane (U.S. 5,481,259). With respect to claims 1 and 9, the Examiner states that Bane suggests a system comprising: at least one master unit (citing Bane, item 15 of Figures 1, 4, and column 2, lines 34-41); a plurality of remote units (citing Bane, item 12 of Figure 1) including means for sensing external conditions and generating sensor data and wirelessly communicating with the master unit (citing Bane, Figure 2, and column 2, line 42 though column 3, line 2); means for calculating a schedule of transmissions from the remotes to the master unit; wherein the means for transmitting from the master unit to the remote units includes transmitting at least part of the schedule' and timing means in the remote units for

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

enabling the remote to transmit external sensor data to the master in accordance with the schedule (citing Bane, item 15 of Figure 4, and column 4, line 60 through column 5, line 52).

After careful review, Applicant must respectfully disagree. Turning first to claim 1, which recites:

1. (Currently Amended) A building monitoring system utilizing bi-directional radio frequency communication comprising:
 - at least one master unit including a radio frequency transmitter and receiver;
 - a plurality of remote units having a radio frequency transmitter and receiver, said remote units capable of transmitting to and receiving from said master unit; and
 - said master unit includes a master scheduler that provides non-colliding predetermined communication times for each of said remote units, wherein there is greater than 1 second between scheduled communication times for at least some of the selected remote units, said remote units have a timer coupled to a controller for enabling said remote units to communicate at said predetermined communication times with said master unit.

As can be seen, claim 1 as previously presented recites a master unit that includes a master scheduler that provides non-colliding predetermined communication times for each of said remote units, and that the remote units have a timer coupled to a controller for enabling said remote units to communicate at said predetermined communication times with said master unit.

In contrast, Bane appears to partition a plurality of remote units into two or more groups (see Bane, column 4, lines 60-66), where each group is assigned a different wake-up period (see Bane, column 5, line 12-13). During a read cycle, all remote units in a particular group are awakened at the same time (see Bane, column 5, lines 17-20). After the group of remote units is awakened, the meter reading device appears to sequentially interrogate each of the awakened

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

remote units by sequentially provide a transmission request addressed to each of the remote units. For example, Bane state:

The read process consists of providing a repeating transmission message from the meter reading device 15 which requests information from a meter interface unit 12 and simultaneously indicates to each unit in all groups to remain in an active communication mode. Upon completion of acquiring information from a first unit, a second unit is interrogated. The process continues for all units of group 1. When sharing a single communication channel, the awaking meter interface units must monitor the channel long enough to cover the gap in transmission while other meter interface units respond. After completion of reading group 1 all of group 2 would be awake and ready to be read.

(Emphasis Added)(Bane, column 5, lines 20-32). As can readily be seen, in Bane, a group of remote units is awakened at a particular time, and then the meter reading device sequentially interrogates each of the awakened remote units. Thus, the “wake-up” periods of Bane appear to merely determine when a group of remote units are awakened, and clearly do not dictate when the remote units actually communicate with the meter reading device.

As can readily be seen, Bane clearly do not disclose or suggest remote units that have a timer coupled to a controller for enabling said remote units to communicate at said predetermined communication times with said master unit, wherein the predetermined communication times for each remote unit are provided by a master scheduler of the master unit, as recited in claim 1. The Examiner appears to acknowledge this in paragraph 3 of the Office Action by stating: “Bane lacks a teaching of the master unit sending transmission times, thereby allowing the remotes to automatically transmit at the scheduled times without the master having to interrogate them”. In view thereof, claim 1 is clearly not anticipated by Bane. For similar and other reasons, claims 2 and 9 are also clearly not anticipated by Bane.

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

In paragraph 3 of the Office Action, the Examiner rejected claims 3, 5, 6, 7, 10, and 12-18 under 35 U.S.C. § 103(a) as being unpatentable over Bane in view of Gaucher (U.S. 6,175,860). The Examiner states that Bane lacks a teaching of the master unit sending transmission times, thereby allowing the remotes to automatically transmit at the scheduled times without the master having to interrogate them. However, the Examiner states that Gaucher suggests a bi-directional communications arrangement in which the master has a transmitter which transmits a schedule for transmission to a transceiver at the remote (citing Gaucher, Figures 4, 5, 6b, and 6c, column 7, lines 48-55 and column 10, lines 47-56 and 61-28). The Examiner states that Goucher's arrangement includes scheduling the remotes as a function of the type of remote (citing Goucher, column 8, lines 40-62 and column 9, lines 37-65). The Examiner concludes that it would have been obvious to one of ordinary skill in the art to modify Bane to have the master transmit the scheduled transmission times, thereby allowing for remotes to automatically transmit at the scheduled times without the master having to send an interrogation signal.

Claim 1 has been amended to recite that there is greater than 1 second between scheduled communication times for at least some of the selected remote units. As can clearly be seen, Goucher relates to an automatic multi-rate wireless/wired computer network (see Goucher, title), which appears to operate at relatively high data rates. At column 10, lines 38-56, Goucher state that there are numerous ways a wireless network can access the channel or RF media including transmitting at the instant of request, listening before transmitting to avoid collisions with other devices (CSMA-CA), and reserving time slots for communication (slotted Aloha/TDMA), etc.

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

However, and consistent with the “computer network” application of Goucher, these communication protocols typically operate at relatively high data rates; often in the hundreds of mega hertz range. In fact, and to provide context, Goucher refer to relatively low data rate devices as those not requiring more than 10’s to 100’s Kbps in data transmission (see Goucher, column 8, lines 5-7). Thus, in Goucher, the time between scheduled communication times (e.g. the slots in TDMA) would be orders of magnitude less than the greater than 1 second now recited in claim 1. In addition, nothing in Bane or Goucher suggest providing greater than 1 second between scheduled communication times for at least some of the selected remote units, as recited in claim 1. In view of the foregoing, claim 1 is believed to be clearly patentable over Bane in view of Goucher. For similar and other reasons, claims 2-11 are also believed to be clearly patentable over Bane in view of Goucher.

Turning now to claim 12, which recites:

12. (Currently Amended) A method for scheduling remote unit radio frequency message transmissions in a building monitoring system, the method comprising:

- a. providing at least one master unit including a radio frequency transceiver, and a controller for operating said transceiver;
- b. providing a plurality of remote units, wherein said remote units include a radio frequency transceiver capable of transmitting to said master unit transceiver and capable of receiving from said master unit transceiver, wherein said remote units have a target transmission period for transmitting a complete message to the master unit;
- c. providing means in said master unit for calculating a master schedule of predetermined remote unit transmission times for said remote units, wherein said predetermined remote unit transmission times are based at least in part on said remote unit target transmission periods, such that collisions are avoided between said predetermined transmissions;

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

- d. calculating said master schedule of predetermined remote unit transmission times based at least in part on said remote unit target transmission periods;
- e. transmitting timing instructions based on said master schedule from said master unit to said remote units; and
- f. transmitting messages from said remote units to said master unit at times based on said timing instructions.

Claim 12 recites, among other things, providing a plurality of remote units, wherein said remote units have a target transmission period for transmitting a complete message to the master unit.

Claim 12 further recites providing means in said master unit for calculating a master schedule of predetermined remote unit transmission times for said remote units, wherein said predetermined remote unit transmission times are based at least in part on said remote unit target transmission periods, such that collisions are avoided between said predetermined transmissions. Claim 12 further recites calculating said master schedule of predetermined remote unit transmission times based at least in part on said remote unit target transmission periods, transmitting timing instructions based on said master schedule from said master unit to said remote units, and transmitting messages from said remote units to said master unit at times based on said timing instructions.

In Aloha/TDMA, the time slots are not based at least in part on the remote unit target transmission periods for transmitting a complete message to the master unit. Instead, the time slots are typically set short enough to allow multiple devices to communicate seemingly simultaneously by interleaving transmissions from the various devices in time across the channel. Because of the relatively high frequency, a complete message is often spread across multiple time slots. As such, Goucher does not suggest the invention recited in claim 12. For

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

these and other reasons, claim 12 is believed to be clearly patentable over Bane in view of Goucher. For similar and other reasons, dependent claims 13-26 are also believed to be clearly patentable over Bane in view of Goucher.

In paragraph 7 of the Office Action, the Examiner indicated that claims 27-30 are allowed.

Now turning to claim 31, which recites:

31. (Currently Amended) A building monitoring system utilizing bi-directional radio frequency communication comprising:

at least one master unit including a radio frequency transmitter and receiver;

a plurality of remote units having a radio frequency transmitter and receiver and at least one sensor, said remote units capable of transmitting to and receiving from said master unit, said remote units also adapted to transmit a message including sensor data to said master unit; and

said master unit includes a master scheduler that provides non-colliding predetermined communication times for each of said remote units, ~~wherein there is greater than 1 second between scheduled communication times for each of at least selected remote units~~, said remote units have a timer coupled to a controller for enabling said remote units to communicate and deliver a complete message including the sensor data to the master unit during each of at least selected ~~at said predetermined communication times with said master unit.~~

As can be seen, claim 31 recites that the remote units are adapted to transmit a message including sensor data to said master unit. Claim 31 further recites that the remote units have a timer coupled to a controller for enabling the remote units to communicate and deliver a complete message including the sensor data to the master unit during each of at least selected predetermined communication times. In Aloha/TDMA and other similar communication protocol mentioned by Goucher, the time slots are not set so that the remote units can communicate and deliver a complete message including sensor data to the master unit during

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

each of at least selected predetermined communication times. Instead, the time slots are typically set short enough to allow multiple devices to communicate seemingly simultaneously by interleaving transmissions from the various devices in time across the channel. Because of the relatively high frequency, a complete message is often spread across multiple time slots. For these and other reasons, claim 31 is believed to be clearly patentable over Bane in view of Goucher. For similar and other reasons, claim 32 is believed to be clearly patentable over Bane in view of Goucher.

Now turning to claim 33, which recites:

33. (Previously Presented) A building monitoring system utilizing bi-directional radio frequency communication comprising:
at least one master unit including a radio frequency transmitter and receiver;
a plurality of remote units having a radio frequency transmitter and receiver, said remote units capable of transmitting to and receiving from said master unit; and
said master unit includes a master scheduler that provides non-colliding predetermined communication times for each of said remote units, said remote units have a timer coupled to a controller for enabling said remote units to communicate at said predetermined communication times with said master unit, said master unit transmitting a next predetermined communication time to each of at least selected remote units after reception during a current predetermined communication time.

(Emphasis Added). None of the cited prior art appears to suggest a master unit that transmits a next predetermined communication time to each of at least selected remote units after reception during a current predetermined communication time. For these and other reasons, claim 33 is believed to be clearly patentable over Bane in view of Goucher.

Now turning to claim 34, which recites:

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

34. (Previously Presented) A building monitoring system utilizing bi-directional radio frequency communication comprising:
at least one master unit including a radio frequency transmitter and receiver;
a plurality of remote units having a radio frequency transmitter and receiver, said remote units capable of transmitting to and receiving from said master unit and further having one or more sensors for sensing one or more environmental variables; and
said master unit includes a master scheduler that provides non-colliding predetermined communication times for each of said remote units, said remote units have a timer coupled to a controller for enabling said remote units to communicate at said predetermined communication times with said master unit, said predetermined times provided by the master scheduler for at least selected remote units being dependent on the expected rate of change of the one or more environmental variables sensed by the one or more sensors of the selected remote units.

(Emphasis Added). None of the cited prior art appears to suggest a master unit that provides non-colliding predetermined communication times, wherein the predetermined times provided by the master scheduler for at least selected remote units are dependent on the expected rate of change of the one or more environmental variables sensed by the one or more sensors of the selected remote units. For these and other reasons, claim 34 is believed to be clearly patentable over Bane in view of Goucher.

Reconsideration and reexamination are respectfully requested. In light of the above remarks, Applicants believe that all pending claims 1-34 are in condition for allowance. If a

Application Serial No. 09/311,014
Amendment dated April 14, 2004
Reply to office action dated January 15, 2004

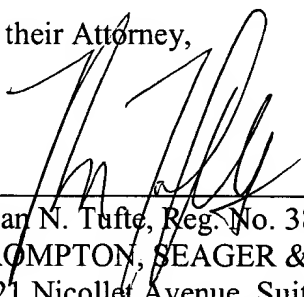
telephone interview would be of assistance, please contact the undersigned attorney at 612-677-9050.

Respectfully submitted,

Michael A. Helgeson et al.

By their Attorney,

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